MULTIMEDIA UNIVERSITY

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FINAL EXAMINATION

TRIMESTER 1, 2017/2018

PMT0201 – MATHEMATICS II

(All sections/ Groups)

11 OCTOBER 2017
9.00 a.m. – 11.00 a.m.
(2 Hours)

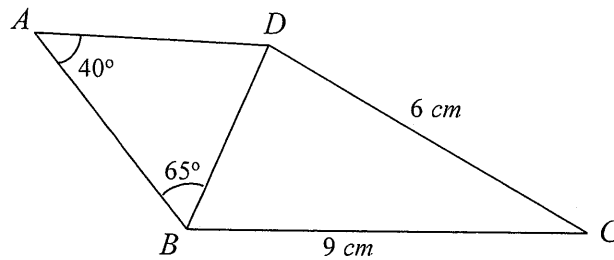| Question	Marks
1	/10
2	/10
3	/10
4	/10
5	/10
Total	/50

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWELVE** printed pages excluding cover page.

2. Answer **ALL** FIVE questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the **QUESTION BOOKLET**. All necessary working steps **MUST** be shown.

Question 1

a) Show that the point $\left(-\dfrac{5}{7}, -\dfrac{2\sqrt{6}}{7} \right)$ is on the unit circle.   (2 marks)

b) Find the exact value of $5\cot^{2}\left(\cos^{-1}\left(-\dfrac{3}{8} \right) \right)$.   (2 marks)

c) Diagram below shows a quadrilateral *ABCD*, with $BC = 9cm$, $CD = 6cm$, $\angle ABD = 65°$ and $\angle BAD = 40°$. The area of triangle *BCD* is 15 cm². Calculate

i) the acute angle, $\angle BCD$. Correct your answer to 2 decimal places.   (2 marks)

ii) the length *BD*. Correct your answer to 2 decimal places.   (2 marks)

iii) the length *AD*. Correct your answer to 2 decimal places.   (2 marks)

Question 2

a) Given that $g(x) = -3\tan\left(x - \dfrac{\pi}{2}\right) + 1$.

    i) Determine the amplitude, period, phase shift and vertical shift of $f(x)$.   (2 marks)

    ii) Sketch the function $g(x) = -3\tan\left(x - \dfrac{\pi}{2}\right) + 1$ for $0° \le x \le 360°$. Indicate clearly the vertical asymptotes and inflection points of the graph for $g(x)$.   (3 marks)

b) Given $w = 5(\cos 25° + i \sin 25°)$ and $z = -1 - i$.

   i)   Find the polar form of z.   (3 marks)

   ii)   Hence, find the polar form of $\dfrac{w}{z}$. Leave the answer in the polar form.   (2 marks)

Question 3

a) Solve the equation $2\sin(2\theta) + \sqrt{2} = 0$ for $0° \leq \theta \leq 360°$. (2.5 marks)

b) Compute the following limits. Show at least one intermediate step.

   i) $\lim\limits_{x \to \infty} \dfrac{5x - 8x^2 - 2x^3}{x^3 + 5}$ (2 marks)

ii) $\displaystyle \lim_{x \to 0} \frac{\tan(5x)}{\sin(2x)}$ (2.5 marks)

c) Given the function $f(x) = \begin{cases} -\dfrac{k}{3x} & if \quad x = 4 \\ \dfrac{\sqrt{x}-2}{x-4} & if \quad x \neq 4 \end{cases}$ is continuous at $x = 4$, find the value

of k.

(3 marks)

Question 4

a) Find the derivatives of the following functions. Show proper steps and simplify your answer.

   i) $y = e^{-2x}\cos(2x)$ (3 marks)

   ii) $y = \sin\!\left(6 - 2x^3 \ln x\right)$ (4 marks)

b) The displacement of a ball is defined as $d(t) = \dfrac{1}{3}t^3 - 2t^2 + 3t$, where $d(t)$ is in meters and t is in seconds. Determine the displacement of the ball if the acceleration is equals to zero.

(3 marks)

Question 5

a) Find the definite integral $\displaystyle\int_{\frac{\pi}{4}}^{\frac{\pi}{3}} \frac{\sin x}{\cos x}\, dx$ using integration by substitution. Simplify your

answer and express in exact value.   (3 marks)

b) Find the indefinite integral $\int \dfrac{x^2+1}{x(x+1)(x-1)}dx$ using partial fractions.   (4.5 marks)

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c) Let R in the diagram below be the region bounded by $y = x^4$, $x = 2$ and $y = 0$.
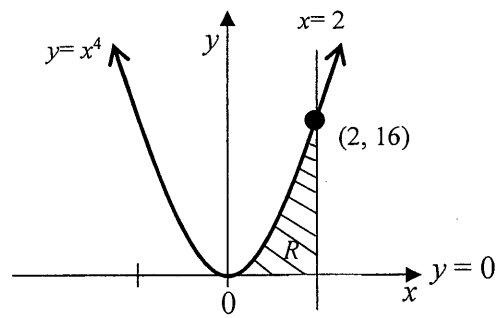
Find the area of the region R. (2.5 marks)

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